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PROVISIONAL SPECIFICATION.

Improvements in Locking Washers for Bolts, Nuts, Screws and the like.

We, WILLIAM HENRY WAKFER, of 67, Whitworth Road, South Norwood, in the County of Surrey, Engineer, and SAMUEL PECK, of Calbourne, Wallington, in the County of Surrey, Gentleman, do hereby declare the nature of this invention to be as follows:—

5 This invention relates to locking devices for effectually preventing bolts, nuts, screws and the like from becoming loose or detached through excessive vibration or other causes, and has for its object the construction of such a device in a simple, cheap and effective form, which, when in use will avoid any cross-strain being exerted on the bolt, nut or screw, and will allow the bolt, nut or screw
10 head taking its load evenly around its surface.

To carry our invention into effect, we form the washer in the shape of a perforated disc of springy material, such as steel, having a series of ratchet teeth provided on both surfaces, the number of such teeth being regulated according to the diameter and width of the washer.

15 The ratchet teeth on one surface are disposed so that they are not coincident with the ratchet teeth on the other surface, but are disposed intermediate thereof, preferably a ratchet tooth on one surface is centrally disposed relatively to two adjacent ratchet teeth on the opposite surface.

In this way we obtain a uniformity of bearing surface on both sides of the washer, so that when the bolt, nut or screw is being forced home, the ratchet
20 teeth gradually force down the portions of the washer intermediate of the teeth until the washer assumes a corrugated form.

It will be noticed in this way a uniformity of pressure is exerted around the bolt, nut or screw head, enabling the strain to be transmitted directly in an
25 axial direction and all risk of cross strain on the bolt, nut or screw is entirely avoided.

In constructing the washer we may either form the ratchet teeth as solid projections rising from the surfaces of the washer or equivalently, the said projections can be forced up from the opposite side by means of suitable tools.

30 It is obvious that the washers may be of any suitable shape, such as conical, dished, or other form than that of flat, to conform to the surface against which they are to abut.

In order to reduce the width of the washers and to give the greatest mechanical advantage to the ratchet teeth to prevent backward rotation, instead of the hole
35 through the washer being of such a diameter as to merely go over the stem of the bolt, or screw, it may be made considerably larger, and the nut or bolt head can be formed with a recessed or shouldered portion on which the washer can be threaded, care being taken that the teeth of the washer project sufficiently beyond the face of the nut so as to properly engage with the surface against
40 which it abuts.

A washer made in this form has practically no risk of fracture, as is the case

[Price 8d.]



Improvements in Locking Washers for Bolts, Nuts, Screws and the like.

with many of the forms of locking washers at present known, but should this occur, this form of washer makes it impossible for it to become detached.

Dated this 20th. day of September, 1910.

FELL & JAMES,
I, Queen Victoria Street, London, E.C., 5
Agents for the Applicants.

COMPLETE SPECIFICATION.

Improvements in Locking Washers for Bolts, Nuts, Screws and the like.

We, WILLIAM HENRY WAKFER, of 67, Whitworth Road, South Norwood, in the County of Surrey, Engineer, and SAMUEL PECK, of Calbourne, Wallington, in the County of Surrey, Gentleman, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

This invention relates to locking devices for effectually preventing bolts, nuts, screws and the like from becoming loose or detached through excessive vibration or other causes, and has for its object the construction of such a device in a simple, cheap and effective form, which, when in use will avoid any cross-strain being exerted on the bolt, nut or screw, and will allow the bolt, nut or screw head taking its load evenly around its surface.

In order that the invention may be the better understood, we will now proceed to describe the same in relation to the accompanying drawing, reference being had to the letters and figures marked thereon. Like letters refer to like parts in the various figures, in which:—

Figure 1 is a side elevation showing one of our washers in position beneath a nut before the final tightening operation.

Figure 2 is a similar view showing the form the washer assumes on the final tightening of the nut.

Figure 3 is a plan of a washer constructed in accordance with our invention.

Figure 4 is a side elevation of a modified washer which is formed of sheet metal.

Figure 5 is a part sectional view showing the application of our washer to a left handed countersunk screw, and

Figure 6 is a front elevation of the same.

To carry our invention into effect, we form the washer in the shape of a perforated disc *a* of springy material, such as steel, having a series of ratchet teeth *b* of rigid formation incapable of deformation provided on both surfaces, the number of such teeth being regulated according to the diameter and width of the washer.

The ratchet teeth *b* on one surface are so disposed that they are not coincident with the ratchet teeth *b* on the other surface, but are disposed intermediate thereof, a ratchet tooth *b* on one surface is disposed approximately central relatively to two adjacent ratchet teeth *b* on the opposite surface.

In this way we obtain a uniformity of bearing surface on both sides of the washer, so that when the bolt, nut or screw head *c* is being forced home, the ratchet teeth gradually force down the portions of the washer intermediate of the teeth until the washer assumes a corrugated form, see Figure 2, and whatever the pressure upon the washer teeth may be the form of the teeth is not disturbed in any way but is maintained intact owing to the rigid character of such teeth.

It will be noticed in this way a uniformity of pressure is exerted around the bolt, nut or screw head *c*, enabling the strain to be transmitted directly in an

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axial direction and all risk of cross strain on the said bolt, nut or screw is entirely avoided.

In constructing the washer we may either form the ratchet teeth as solid projections rising from the surfaces of the washer as shown in Figures 1, 2, 3, 5 and 6 or equivalently the said projections can be forced up from the opposite side, see Figure 4, by means of suitable tools.

In Figures 5 and 6 the application of the washer to a left handed counter-sunk screw is illustrated, the washer *a* having teeth *b* which engage with both the head *c* of the screw and the counter-sink *d* formed in the body of the material.

10 It is obvious that the washers may be of any other suitable shape to conform to the surface against which they are to abut.

In order to reduce the width of the washers *a* and to give the greatest mechanical advantage to the ratchet teeth *b* to prevent backward rotation, instead of the hole through the washer *a* being of such a diameter as to merely go over the stem of the bolt, or screw it may be made considerably larger, and the nut or bolt head *c* can be formed with a recessed or shouldered portion on which the washer *a* can be threaded, care being taken that the teeth *b* of the washer project sufficiently beyond the face of the nut *c* so as to properly engage with the surface against which it abuts.

20 A washer made in this form has practically no risk of fracture, as is the case with many of the forms of locking washers at present known, but should this occur, this form of washer makes it impossible for it to become detached.

We are aware that it has been proposed to provide washers for locking-nuts, consisting of a perforated disc of flexible material provided with flexible teeth on both surfaces, the teeth on one surface being disposed intermediate of the teeth on the other surface and we do not claim such devices broadly.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

30 1st. A locking washer for bolts, nuts, screws and the like, consisting of a perforated disc of flexible material, provided with rigid teeth on both surfaces, the teeth on one surface being disposed intermediate of the teeth on the other surface so that upon compression under the nut or screw, the said flexible perforated disc assumes a corrugated form, substantially as described.

35 2nd. A locking washer for bolts, nuts, screws and the like, constructed substantially as described and illustrated in Figures 1 and 2 of the accompanying drawing.

3rd. A locking washer for bolts, nuts, screws and the like, constructed substantially as described and illustrated in Figure 4 of the accompanying drawing.

40 4th. A locking washer for bolts, nuts, screws and the like, constructed substantially as described and illustrated in Figures 5 and 6 of the accompanying drawing.

Dated this 20th. day of March, 1911.

45 FELL & JAMES,
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[This Drawing is a reproduction of the Original on a reduced scale.]

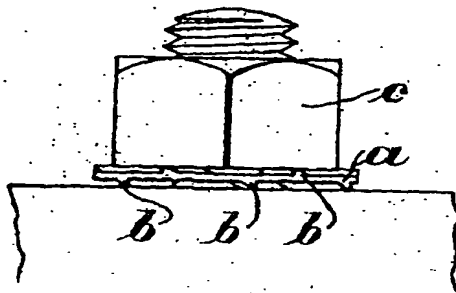


Fig: 1.

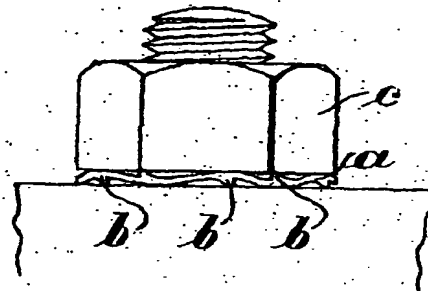


Fig: 2.

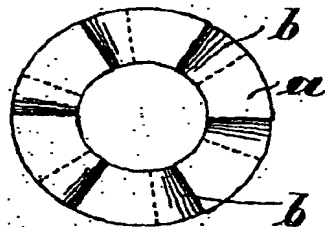


Fig: 3.

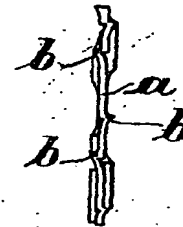


Fig: 4.

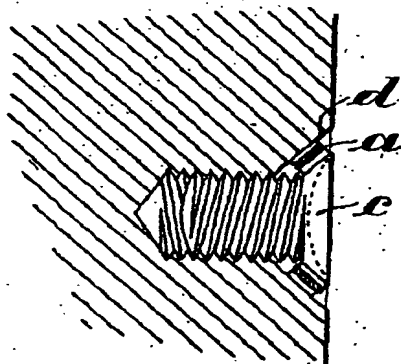


Fig: 5.

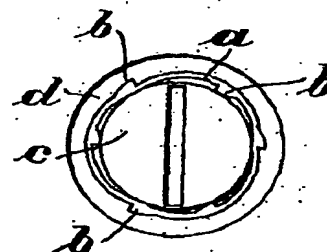


Fig: 6.

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